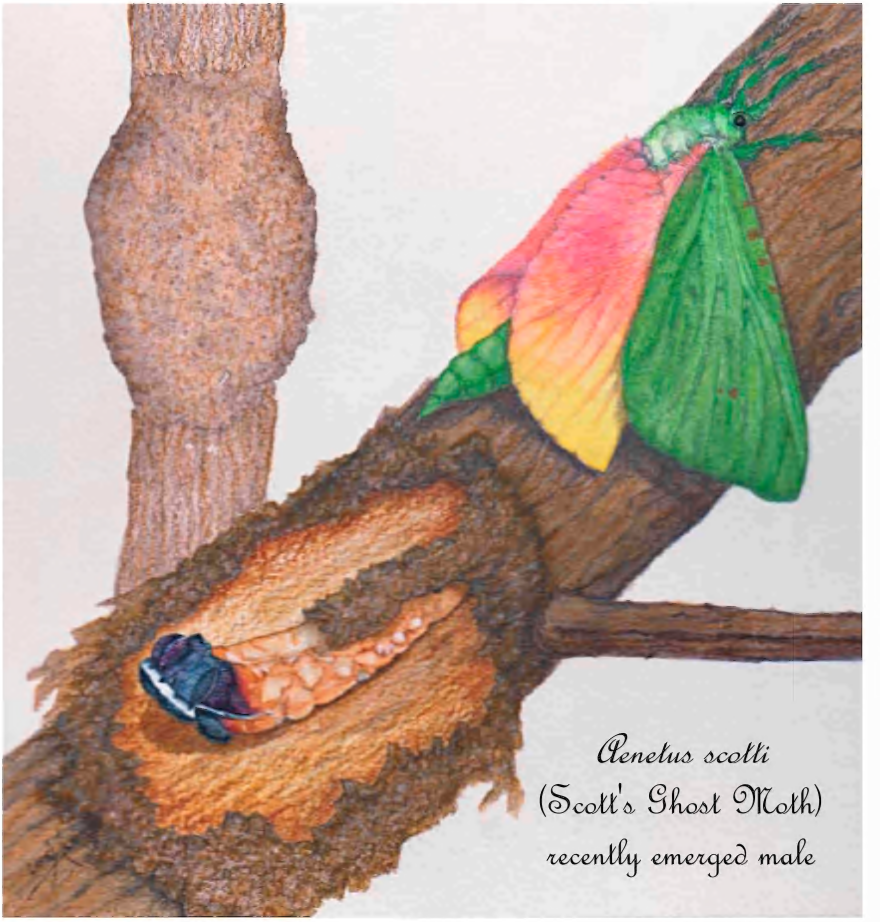

METAMORPHOSIS
AUSTRALIA

Magazine of the Butterfly & Other Invertebrates Club

ISSUE NO: 63 DATE: DECEMBER 2011 ISSN: 1326-0006
Price $6.00 http://www.boic.org.au

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A quarterly meeting is scheduled in order to plan club activities and the magazine. See BOIC Programme.

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AIMS OF ORGANIZATION

- To establish a network of people growing butterfly host plants;
- To hold information meetings about invertebrates;
- To organize excursions around the theme of invertebrates e.g. butterflies, native bees, ants, dragonflies, beetles, freshwater habitats, and others;
- To promote the conservation of the invertebrate habitat;
- To promote the keeping of invertebrates as alternative pets;
- To promote research into invertebrates;
- To encourage the construction of invertebrate friendly habitats in urban areas.

MAGAZINE DEADLINES

If you want to submit an item for publication the following deadlines apply:

March issue – February 1st
June issue – May 1st
September issue – August 1st
December issue – November 1st

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COVER

Aenetus scotti (Scott's Ghost Moth) – Painting by Lois Hughes

FROM THE PRESIDENT

Ian Ferrier has again affirmed the principle that, while dealing with the things of nature, we may encounter the unexpected. The often-maligned Lantana bush, the flowers of which often provide nectar when there is a shortage of other flowers, unexpectedly proved to be a host for a rather attractive moth. You will read of this rediscovery in our "Creature Feature" story.

Two books of butterfly art are reviewed in this edition of our magazine. A series of new paintings by Lois Hughes adorns "Birdwings' New Home" while many historic paintings of Australian butterflies are to be found in "A Flutter of Butterflies". I commend them to you.

I thank those contributors who have donated their time and knowledge to make this edition an informative and enjoyable read. Their support is invaluable.

It is often said that as we get older time goes faster. From my perspective this seems to be a valid statement. 2011 is rapidly coming to a close. I look back on another generally successful year and wish you all a happy Christmas and an interesting 2012.

Best wishes **Ross**

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A Ghost Moth Story – Notes on *Aenetus scotti* (Scott, 1869) Lepidoptera: Hepialidae - *John Moss* and *Ian Ferrier*

The hepialid family (Ghost or Swift Moths) contains some of our most interesting primitive, mainly wood-boring, moths and within that group the "Splendid Ghost Moths" (genus *Aenetus*) are some of the most beautiful! Charles King, Ian's grandfather, amassed a large hepialid collection, mainly from Mt Tamborine where he resided. Many of those specimens have found their way (via the University of Queensland Insect Collection) to the Australian National Insect Collection in Canberra. (An illustrated story on this topic will appear in a later issue of the magazine).

The larger species have striking pale blue males and green and pink females. The medium sized *A. scotti* (with wingspan 60-90mm) has both sexes with rich green forewings (plus dorsum of head and thorax) and intense pink base to the hindwings and underside. These colours fade quickly after death.

The males have an expandable brush of glandular hairs attached to the (vestigial) hind tibiae (Fig. 1) which produce a secretion with a "strong and rather pleasant scent" (Dodd 1902). The scent is thought to be a sex pheromone that stimulates the females to fly towards the "calling" males (Common 1990). It is relevant to note that in the Cossidae (another family of borer moths) it is the female which produces the pheromone and the males fly to her from downwind.

A. scotti, male underside showing tufted hairs on vestigial hind tibiae

The adults in both of these families have no proboscis and therefore cannot feed. They rely solely on their built up fat reserves for sustenance. Hepialids also have tiny antennae as do many cossids, although a few male cossids are better endowed! The adult lifespan in hepialids is at most a few days, within which time all activity is related to the mating and egg laying processes.

Most eggs are just scattered over the ground by the female. The early larval stage of many (if not all) *Aenetus* species is spent under logs or in the leaf litter (see larval image in Common, Figure 50.15). At some stage they ascend a shrub or tree and bore into the wood but retain a connection with the outside by building a shelter in the

form of an inflated bag-like structure, composed of macerated bark and wood plus frass woven into a silken web (Figs 2, 3). The so-called "Tree Larva" then commences to bore in a downward direction through the trunk or stem. It is interesting to note that in the Cossidae the larvae generally bore upwards!

Figs 2,3 - *A. scotti*, larval shelter on *Lantana camara* stem

To quote Common, 1990, "Pupation occurs in the larval tunnel and, by means of ventral plates and dorsal spines on the abdomen, the pupa is able to move freely up or down. Just before adult eclosion (emergence) the pupa (Fig. 4) is partly protruded from the tunnel entrance (Fig. 5) and the pupal exuviae remain in this position". Once the insect emerges, it crawls to a resting position and expands and dries its wings before taking flight in the early evening (Fig. 6).

Fig. 4 - *A. scotti*, spent pupal case (lat. view)

When *A. scotti* was first discovered (near Lismore in about 1860) it was said to be "infesting" the stems and branches of young stinging trees (now *Dendrocnide excelsa*, Urticaceae). It was also said to be partial to native wisteria (now *Callerya megasperm*a, Fabaceae) (Scott 1869). As well as native plants, a few species of *Aenetus* have been known to utilise exotics such as lantana as host trees e.g. *A. ligniveren* (Common 1990); *A. splendens* (Mike Day, pers. comm.). Until recently there was but a single

Fig. 5 - *A. scotti*, spent pupal case protruding from larval shelter

record for *A. scotti* using lantana at Ingham, North Queensland (Common 1990). In August this year, when one of us (I.F.) was working in a bushcare project, involving weed removal and forest regeneration at Sparkes Hill, Stafford (Brisbane), several presumptive *Aenetus* shelters were found on lantana that was being removed. From these shelters two adult males of *A. scotti* emerged (on 30th September and 10th October), confirming lantana as a host plant.

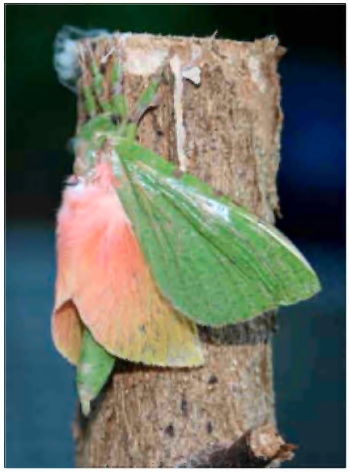

Fig. 6 - *A. scotti*, newly emerged adult male

Postscript: There remain a few puzzles in the historical treatment of *A. scotti* and at least one other species (*A. scripta*) not the least being the descriptor's apparent naming of a taxon after himself!! The story of the Scott family especially Arthur Walker and his talented artistic daughters makes fascinating reading and will itself be the subject of a follow up article to this in due course. [A new butterfly publication (authors Braby and Olsen), reviewed herein, devotes one chapter to the family and is interesting reading.]

Acknowledgements: Our thanks to David Britton of the Australian Museum for making available a copy of Transactions of the Entomological Society of NSW and Mike Day of DEEDI for sharing his unpublished *A. splendens* lantana hostplant information.

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Photographs - The authors

ITEMS OF INTEREST

Different but the same – *Peter Hendry*

Polymorphism in Lepidoptera:

Many readers may be familiar with the term sexual dimorphism, in which the male and female of a species look different. A prime example of this is the Varied Eggfly, *Hypolimnas bolina*, (Linnaeus 1758) (Fig. 1). Those who know this butterfly will realise that the female comes in many forms (Fig. 2), that is to say she is polymorphic.

Hypolimnas bolina male

Hypolimnas bolina females

The term polymorphic is derived from the Greek, *polys* meaning many and *morphe* meaning forms. This is a condition in which one species displays several anatomical forms or colour variants (Gordh and Headrick 2011). Polymorphism has been identified in at least 20 orders of insects and probably occurs in all major insect groups (Gordh and Headrick 2011).

On a "Bug Catch" excursion with the Entomological Society of Queensland I managed to collect several specimens of moths (Fig. 3) which I was able to trace to the genus *Lophoptera*; a genus in the subfamily Stictopterinae in the family Noctuidae. As much as I tried, it proved impossible to place them to species level. I had representative images for all the Australian species, none of which matched my specimens. I was starting to believe I had 3 or 4 unnamed species when I discovered an image of *Lophoptera hemithyris* (Hampson, 1905) in the book "Moths of Thailand". *L. hemithyris* also occurs in Australia and this Thailand image was close to one of my specimens but differed considerably from other images I had of Australian forms. While in Canberra for the 5th biannual moth conference I looked up the *Lophoptera* in the Australian National Insect Collection

and found examples of all my *Lophoptera* specimens under *L. hemithyris*; a truly polymorphic species.

Fig. 3

Forms of *Lophoptera hemithyris*

Fig. 4

Forms of *Oxyodes tricolor*

There are many examples of polymorphism in the Australian Noctuidae. Probably the best known is *Oxyodes tricolor,* Guenée, 1852 (Fig. 4), a member of the subfamily Catocalinae. Previously published in "Metamorphosis Australia" are examples of the polymorphic *Anthela varia* (Walker [Aug.] 1855) Anthelidae (#50 page 31) and *Syntherata janetta* (White 1843) Saturniidae (#51 page 29).

Although the phenomenon of polymorphism makes the identification of some lepidoptera very difficult it is one of the joys of studying such a diverse group of insects. Photos Peter Hendry

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Life history notes and observations of the Orange Emperor, *Charaxes latona* Butler, 1865 [Lepidoptera: Nymphalidae] –

Mark Hopkinson

The Orange Emperor butterfly, *Charaxes latona* Butler, 1865 [Lepidoptera: Charaxinae] is a fast-flying and conspicuous insect on the wing and can be found throughout the year along forest margins high in the canopy where it perches, sometimes for long periods. Adults are attracted to sap flows and are said to be attracted to fermenting fruit baits. This species is currently known from rainforest in the Iron Range National Park (Cape York Peninsula, northern Queensland), with most sightings by the author between the first and second Gordon Creek crossings, as well as "The Knoll" on the way to Mt Lamond.

The life history was partially described by Wood (1986) from a late instar larva, and fully described from egg by Johnson and Valentine (2009). The only recorded foodplant to date is the Rusty Laurel, *Cryptocarya triplinervis* (Lauraceae)
On the 12th September 2010, a fresh adult female of *Charaxes latona* was captured by the author 12m above the ground on a sap flow from a large Leichhardt tree (*Nauclea orientalis:*Rubiaceae) on the side of the road near the first Gordon Creek crossing at Iron Range National Park. Around 20 minutes later, an adult male was also secured at around 16:30hrs on a tree overhanging the Gordon Creek bridge. Adult specimens were pinched before being removing from the net.

Pair of *Charaxes latona* (male in foreground)

The live adult specimens (Fig. 1) were papered and brought back to Cairns in a car fridge on the 13th September. On the 14th of September, the adult female was

surprisingly still alive. She was fed a sugar solution (Fig. 2) for around half an hour in an ambitious attempt to get her to lay eggs on a small potted *Cryptocarya triplinervis*.

Fig. 2

Due to the inherent difficulty in obtaining fresh specimens and rather than risk damage to the fresh female in the attempt to obtain eggs, it was decided to immobilize the specimen on a setting board. This was done on the 15th September.

On the 16th September, it was noticed that the female (Fig. 3) had deposited 12 eggs in the groove of the setting board. The eggs were removed from the setting board and transferred to specimen jars in groups of 2 or 3 per jar.

Fig. 3

C. latona female, upperside left, underside right

Eggs

The fresh eggs (Fig. 4) were yellow, spherical with a flat base and around 3mm diameter. Some of the eggs that did not hatch changed to a dark colour, almost black.

Four 1st instar larvae were noticed in the containers on the 21st September (some 5 days later). Other larvae had emerged and regrettably escaped from their containers.

Fig. 4

Yellow fertile egg and 2 infertile eggs

First Instar

The larvae were transferred to soft cuttings of the larval food plant in a single small vase within an

aerated (but covered) container. The first instar larvae had eaten very little after the first day and a half, and were then transferred to mature leaves (Peter Valentine, pers. comm.). First instar larvae preferred eating the mature leaves, and for most of the time, tended to rest on a constructed silken pad (as do *Polyura* larvae). Larvae had now turned from a greeny-brown colour to a light green colour with tiny yellow spots (Figs. 5a, b, c).

1st instar larvae

Five days after hatching (26th September), a white spot started to become evident on the thorax of three of the four larvae, still at first instar.

Duration of 1st instar larvae was 8 days.

Second Instar

On the 29th September, three of the four larvae had gone to the second instar. The other still had not started to develop, and despite being quite active, died after 11 days. The skins and head capsule of the first instar larvae were first consumed by the larvae.

The white thoracic spot became a prominent white chevron (Fig. 6).

2nd instar larva

Third Instar

On the 4th October, two of the larvae had moved to the third instar (Figs 7a, b, c).

3rd instar larvae

Fourth Instar

On the 13th October, two of the three larvae moved to the 4th instar (Figs 8 a, b, c). Note the distinctly green head capsule now, and the asymmetrical spots on the larva in Fig. 8c. This larva turned out to be female.

Fig. 8a

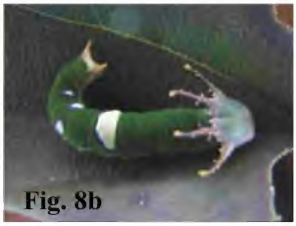
Fig. 8b

Fig. 8c

4th instar larva

Final Instar

31st October – Returned from Brisbane to find larvae thriving on the potted plant. Decision made to leave them there for now. One of the larvae had moved to the final instar (Fig. 9). On the 3rd November, the two remaining larvae moved to the final instar also.

Fig. 9a

Final instar larva

Fig. 9b

Pre-pupa

By now the larvae had defoliated my potted plant, and those remaining had to be transferred back to cut plants in containers.

Pupa

On the 28th November, the first larva pupated, followed by the second two days later (Figs 10 a and b).

On the 9th December, a runted (smaller than usual) female emerged from one of the pupae (Fig. 11).

This is possibly the first female of the species to be reared in captivity!
On the 12th December, a runted male emerged (Figs 12a and b).

Pupa dorsal view

Pupa lateral view

Freshly emerged female

Freshly emerged male

Duration of Stages

The duration of the immature stages of *Charaxes latona* as observed in Cairns between September and December 2010 is as in the accompanying tabulation. Also included for comparison is the 2009 data recorded by Valentine and Johnson.

Stage	**Start**	**End**	**Days**	**Valentine and Johnson 2009 (Days)**	**Larval length range (mm)**	**Valentine and Johnson 2009 (Lengths)**
Egg	15/9/10	21/9/10	6	7	n/a	
1st instar	22/9/10	29/9/10	8	6	n/a	4 – 6mm
2nd instar	30/9/10	4/10/10 to 6/10/10	5 - 7	17 - 19	n/a	7 – 10mm
3rd instar	5/10/10 – 7/10/10	13/10/10 - 18/10/10	9 - 12	16 - 17	to 19	11 – 25mm
4th instar	13/10/10 – 18/10/10	30/10/10 – 2/11/10	16 - 18	14	20 – 28	26 – 39mm
Final instar	30/10/10 – 2/11/10	27/11/10 -	28	41 - 43	29 - 50	40 – 60mm
Pupa	28/11/10 30/11/10	9/12/10 12/12/10	12 f 13 m	18	22 f 24 m	25mm
TOTAL			85 -	119 - 124		

Acknowledgements
Thanks to Queensland Parks and Wildlife Service and the Entomological Society of Queensland for scientific permits under which this work was conducted. Thanks go to fellow collector and lifelong friend Scott Bourne, who accompanied me in the field and shared the excitement of capturing our first *Charaxes*.

Photos Mark Hopkinson

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Is it a beetle? No, it's a spider! – *Robert Whyte*

Coccorchestes ferreus

These superb photographs by Dr Greg Anderson of the extraordinary jumping spider *Coccorchestes ferreus* from Iron Range, Far North Queensland, show probably the weirdest example of mimicry in the spider world.

It is a form of mimicry where predators mimic a harmless model, allowing them to avoid being correctly identified by their prey or their predators.

In many cases mimics are like wolves in sheep's clothing, preying on the model they are imitating. There are many cases of ant-eating ant mimics in the invertebrate world, notably amongst spiders and insects.

This is probably not the case with *Coccorchestes ferreus*. This spider may eat beetles, but it is more likely it eats other more soft-bodied prey. It would seem such an armoured animal as the beetle being mimicked might be a tough meal.

It is also unlikely this is a case of an animal mimicking its predator, like a moth resembling its spider predator. Beetles looking like this spider are more likely to be vegetarian — although to be fair, very little is known of the biology of this spider. Charles Griswold described it in 1984, but only from one animal, the holotype found in 1949 by N. H. L. Krauss, now in the collection of the Queensland Museum.

Coccorchestes ferreus is more likely a case of mimesis, in between camouflage and mimicry, in which the mimic takes on the properties of a specific object or organism, but one to which the predator is indifferent. In this way it may avoid being eaten by predators of spiders which identify them by sight.

Coccorchestes ferreus

Coccorchestes ferreus is the only Australian species in its genus. All the other described species are known from New Guinea and New Britain. The genus was erected by Thorell in 1881, revised by Prozynski in 1976 and revised again by Balogh in 1980 at which time there were 39 species. Griswold's Australian *Coccorchestes* was the 40th.

The name *ferreus* refers to its location, Iron Range, ferreus meaning iron. This is also the location where Dr Greg Anderson found his specimen.

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Photos Dr. Greg Anderson

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Life history notes on the Yellow Albatross, *Appias paulina ega* (Cramer, [1777]) Lepidoptera: Pieridae - *Wesley Jenkinson*

This butterfly species, previously known as the Common Albatross, appears to have limited detail published about its biology and migratory habits. It is encountered along much of coastal and sub-coastal eastern Queensland and other states. Migratory adults can be located well outside the breeding areas, particularly after widespread rainfall has occurred.

In Southeast Queensland it is seasonally common and the adults can be found in a varied range of habitats including suburban gardens. In this region the breeding habitat is chiefly dry rainforest and vine scrub where the host trees Yellow Tulipwood

(*Drypetes deplanchei*) are growing. This is the main host species utilised for breeding with several other possible host species requiring confirmation (Moss 2010).

Adults often fly with two other similar looking Pieridae species, the Caper White (*Belenois java*) and the Caper Gull (*Cepora perimale*) and they can be confused with them. The male could also be easily confused with the well-known exotic Cabbage White butterfly (*Pieris rapae*), which is much smaller in size, has different wing markings and slower flight behaviour.

Adult flight is rapid and strong especially if they have been disturbed. They are typically observed flying around forest canopies and margins during sunny periods. The males also frequently visit hilltops from late morning until mid afternoon. I have observed that, while feeding at flowers, their wings can be partially open at various angles (between approx 20 to 45 degrees). Both sexes can also be observed imbibing moisture from puddles ('mud puddling') during extremely hot conditions. During cloudy or very hot conditions the adults typically settle, with their wings closed, on the upper surface of leaves in shaded forest understorey, often within two metres of the ground. Both sexes are readily attracted to a wide range of small native and introduced flowers.

Appias paulina (Yellow Albatross) images left to right: male, female uppersides

Appias paulina (Yellow Albatross) images left to right: male, female undersides

Within Queensland, the adults show only very limited variation in their wing markings. Wingspans for the pictured adult specimens are: males 55 mm and females 54 mm.

During December 2006, an ovipositing female was observed near Aratula in Southeast Queensland fluttering slowly in dappled sunlight around small host trees in dry rainforest understory. She settled and curled her abdomen onto the upperside of a fresh young leaf. An egg was laid singly and the wings remained closed while ovipositing occurred. When fresh young leaves are scarce, several eggs may be laid on either side of a single leaf by different females. When large numbers of females are ovipositing, eggs are also laid on mature leaves. However, it is doubtful if the resultant larvae survive.

On December 27th 2008, an egg was collected and raised through to an adult on *D. deplanchei*. This egg was pale white, barrel shaped, approximately 0.4 mm wide x 1.0 mm high, with 14 vertical ribs and very fine horizontal lines between them.

Freshly laid egg

Raised in captivity, the larva consumed the eggshell soon after hatching and feeding later commenced from the outer edge of a small soft leaf. During the larval stages it rested either along the upperside or the underside of the leaf midrib similarly described by P. Valentine in 1988 (Braby 2000). I have also observed larvae in the wild resting along the stems near the leaves they had been feeding on. The captive larva fed openly during the day, completed five instars and attained an approximate length of 32 mm.

Larval instars

In captivity the pupa, measuring 24 mm in length, was located below a mature leaf of the host plant. It was attached with silk by the cremaster and a central girdle.

Pupa

Male pupa pre-emergence

The total time from egg to adult was about three weeks, with egg duration of 4 days, larval duration 11 days and pupal duration of 7 days.

Within the new boundary of the Scenic Rim Regional Shire south of Brisbane, I have records of adults from September through to June. However, this relates to the timing of local rainfall triggering fresh growth of the host plants. Further observations are required in this locality to determine the number the generations per year. Here the main breeding period is usually December and January when the adults are more numerous.

Photos Wesley Jenkinson

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The Tale of Two Travelling Caterpillars - *Margaret Greenway*

In March 2011 I visited my friend Jackie in Esperance, WA. On arrival she showed me two strikingly colourful caterpillars (Fig. 1) that had been demolishing her small *Grevillea* sp**.** When disturbed these caterpillars threw back their head and thorax (Fig. 2). Being only an amateur entomologist I was unable to identify the species of this instar. Jackie wanted the two hungry 'pests' removed from her *Grevillea* and as we were going away on a 10 day trip to the Stirling Range and the Porongurups we took the caterpillars,

Psalidostetha (*Danima*) *banksiae* larva on *Grevillea* sp. – Photo Margaret Greenway

plus a supply of leaves, with us. Of course within a few days the leaves had been consumed and we were unable to find more of the same species. We offered the caterpillars other *Grevillea* species but they were not interested and gradually commenced shrinking prior to pupation.

Psalidostetha (*Danima*) *banksiae* larva in warning pose – Photo Margaret Greenway

Finally after 5 days (23rd March) and to our great pleasure they had completely pupated. I knew John Moss would be able to identify the emergent adult so I returned to Brisbane with the two pupae. From my description of the larvae and my photos John suspected that the hungry culprits were the larvae of the well known Banksia Moth- *Danima banksiae* (now *Psalidostetha banksiae*) (Lewin). The first adult - a male - emerged on 17th April (Fig. 3) and was confirmed by John as *P. banksiae*. The second adult - a female (Fig. 4) probably emerged a few days later but we departed for our Kroombit Tops Expedition on 19th April. On our return the female was dead but had laid a mass of infertile eggs. Unfortunately we had already removed the male to the freezer so no mating took place.

Psalidostetha (*Danima*) *banksiae* adult male
Photo Margaret Greenway

Psalidostetha (*Danima*) *banksiae* adult female
Photo John Moss

According to Ian Common's "Moths of Australia", *P. banksiae* is a moth in the family Notodontidae. The larval host plants of *P. banksiae* are all in the family Proteacae and include *Grevillea*, *Hakea*, *Banksia* and *Dryandra*. *P. banksiae* is found throughout Australia, including Tasmania. There are two images in Common. Plate 29, Fig. 14 shows the final instar larva characteristically with its reared anterior portion in warning pose. However the "dark purple bifid organ from beneath the head" is not readily visible in the photograph. The adult is illustrated in colour on Plate 17, Fig. 2.

John mentioned that there are at least two Australian nymphalid butterflies whose larvae have a similar eversible osmeterium-like structure on the underside between head and thorax. The function of this organ is thought to deter predators, by probably giving off a foetid smell. However the smell was not apparent to me. John said that most amateur lepidopterists and even many children are familiar with the sickly sweet-smelling dorsal osmeterium of the Orchard Swallowtail butterfly larvae.

We feel that it would be a useful exercise to photograph the organ in question if any of our readers were to come across any larvae on proteacids.

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Host plant for *Euproctis paradoxa* (Lepidoptera: Lymantridae) and notes on Genus *Euproctis* – *Peter Hendry*

In early December 2010 a Lymantrid larva was found in my garden feeding on the Early Flowering Black Wattle (*Acacia leiocalyx*). By mid December it had pupated within a cocoon incorporating the larval hairs and emerged on Christmas Day.

Euproctis paradoxa larva

Larva showing glands on the 6th and 7th segments

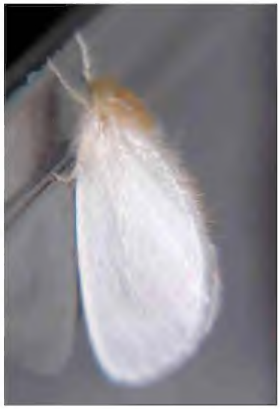
Larva showing thoracic glands

Euproctis paradoxa cocoon

The larva is hairy and translucent green-yellow in colour with an orange-yellow dorsal line and a whitish mid-dorsal line. On either side of this mid-dorsal line on

abdominal segments 1 to 7 there is a pair of raised grey areas from which several long setae (hairs) arise. There are red mid-dorsal glands on the 6th and 7th segments and pairs of white glands on either side of the mid-dorsal line of the prothorax and mesothorax.

I consulted with Peter Mackey, who has been studying the Lymantridae for many years. I was advised to check the adult for long ochreous scales on the posterior edge of the forewing, as the Lymantridae species cannot currently be identified via the larva. After flight these scales can be completely lost (Mackey pers. comm.). As these scales had been present on my specimen Peter declared it to be *Orvasca paradoxa*. Other species of *Orvasca* that have these ochreous scales also have some black scales on the abdomen as well (Mackey pers. comm.).



Euproctis paradoxa adult

It is estimated that most of the Australian Lymantridae are yet to be described. The Checklist (1996) tried to stabilise many misplaced species from the complex of *Porthesia, Chionophasma* and *Euproctis* referred to by Common (1990). This was done by placing them in *Euproctis.* In 1999 Holloway, in Moths of Borneo, broke the *Euproctis* into a number of genera. He placed the *E. aliena,* which occurs in Australia, into *Orvasca* but none of the other small white *'Euproctis'*. *E. paradoxa* also belongs in *Orvasca*, but it has not been formally transferred, so officially it is still *Euproctis paradoxa* (Mackey pers. comm.).

I am indebted to Peter Mackey for his identification and information.

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Photos Peter Hendry

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The Lepidoptera Proboscis – *Hilton Selvey*

All lepidoptera in Australia have a proboscis the function of which is to convey liquid food to the insect's gut. There are however, notable exceptions; the moth family Lymantriidae (Tussock Moths) that do not feed, the most primitive moth groups the Micropterigidae that feed on pollen and spores and the Moth Butterfly (*Liphyra brassolis*) that has only rudimentry mouth parts (Ref. 6).

The proboscis is a very complex and interesting structure, which has engaged the attention of entomologists for over a hundred years (Ref. 2).

During metamorphosis two structures, called galeae, are formed from projections of the maxillae. These galeae which are separate at first, join to form the proboscis (Figs 1 and 6). The proximal part of the proboscis can be seen to be separate for a short distance before the galeae join and thus cannot be attached to the mouthparts, the glossa.

The galeae are "C" shaped rings of chitin with a concave border where the chitin becomes thicker. Chitin is a polysaccharide combined with proteins. When also combined with a substance called sclerosin it becomes hard but flexible. Presumably the more sclerosin the harder the chitin, indeed, some insects have mouthparts that can cut wood. On the other hand when chitin is combined with a substance called resilin it becomes flexible and like rubber it can be stretched under tension returning to its original shape when the tension is removed (Ref. 1).

Each galea is the mirror image of the other. The rings are stacked one upon the other and taper in size from the head to the tip of the proboscis (Fig. 2). Each ring is linked to the next by a very thin flexible membrane of chitin combined with resilin that forms a deep groove between the galeae (Fig. 5). The circular cavity between the galeae is called the food canal; liquids pass up this canal by capillary attraction.

There are two projections from the concave borders of the galeae, one dorsal and the other ventral. These projections are called legulae and are different in appearance and function. Those on the ventral end are hooks that keep the galeae together while those on the dorsum are flat and provide a waterproof covering for the food canal. These legulae are hatchet shaped with a narrow stalk that forms a flexible joint with two adjacent galeae rings (Figs 3 and 4).

After emerging from its pupa and while a butterfly is expanding its wings, the galeae join together like a zip fastener. This fascinating process can easily be observed as repeated uncoiling and coiling enables the ventral legulae to clip together and the dorsal legulae to interlock forming a watertight covering of what will become the food canal.

When the galeae are fully joined the structure now called a proboscis, is coiled tightly and tucked below the head between the labial palps. The proboscis of the larger butterflies in Australia is 40 mm or so in length and forms a coil 5 mm in diameter, which is too large to fit under its head. The proboscis of an 8 mm moth, is only 2 mm when uncoiled. When coiled it can only be seen with a microscope.

Cross sections of the proboscis reveal the contents of the galeae; nerves, muscles and a trachea (Figs 2 and 3). The muscles are arranged into two series of oblique longitudinal bands running throughout the entire length of the galea. Striations in the muscles are similar to those of skeletal muscle, but these striations were only observed under the microscope when studying the stained sections and cannot be seen in my photographs of the sections. That the muscles have striations is not surprising

considering that the physiology of insects is in many ways so similar to our own (Ref. 3). The inside of the galea is lined with a cellular membrane thrown into folds. The circular tube is the trachea. Unfortunately the tracheoles are not seen because of the difficulty in cutting and staining (Fig. 3). However, a single tracheole is seen close to the trachea.

As one would expect the proboscis has numerous sensilla. These have various names depending on their shape, but they are concerned with taste and the position of the proboscis (Ref. 3).

Butterflies have a pair of spiracles, one on each side of abdominal segments one to seven. The spiracles are the openings of the tracheae, which branch and divide repeatedly forming very thin tubes called tracheoles. A very thin membrane closes the ends of the narrowest tracheoles preventing loss of haemolymph but allowing the passage of oxygen and carbon dioxide according to their partial pressures. The trachea in the galeae is a long way from the nearest spiracle so the gaseous exchange will be poor, but haemolymph within the galeae will provide additional gaseous exchange as well as the nutrients required by the muscles, nerves and the lining membrane. The movements of the haemolymph are discussed below.

The mechanism of movement of the proboscis has been extensively studied. It was earlier thought that contraction of some the intrinsic muscles of the galeae would uncoil the proboscis and other muscles could recoil it. More studies involving the proboscis of the Hawk Moth have shown that the uncoiling is due to haemolymph being pumped into the galeae by two stipital pumps, one for each galea. The pumps are situated in the butterfly's head and work in synchrony 3-4 times a second. When fully uncoiled the pumps contract alternately to save energy and to maintain the pressure. To recoil the proboscis, the pumps cease activity and haemolymph flows back into the head. Contraction of both sets of oblique galeal muscles causes the proboscis to recoil, a process that is supported by elasticity of the galea cuticle. Recoiling starts at the end of the proboscis and proceeds towards the head and when tightly coiled it is then tucked back below the head by extrinsic muscles. When uncoiling, other extrinsic muscles bring the coil forward and the stapedial pumps commence pumping (Ref. 7).

To uncoil, the galeae must separate to accommodate the extra haemolymph. On the dorsal plane the rings come together and on the ventral plane they must separate. The reverse happens when the proboscis is recoiled. The very thin flexible link of chitin and resilin between the rings allows this movement (Fig. 5). The flat plates of the dorsal legulae are able to slide one upon the other.

Fluid passes up the food canal by capillary attraction, the thinner the tube the faster and further the fluid will flow. Viscosity also plays a part, the more viscous the fluid the slower it will flow. Nectar is more viscous than water but the difference will not

be apparent in the capillary tube that is the butterfly's food canal. As explained above, the food canal is not formed until the galeae come together, there has therefore, to be a space between the food canal and the glossa. The problem is that since there is no connection between the food canal and the glossa, with its so called suction pump that is only peristaltic movements of the upper part on the gut, how does fluid get to the glossa? (Krenn *et al*. described this pump Ref. 5). There is only one solution to this problem; multiple hairs between the food canal and the glossa will cause movement of fluid by capillary attraction. These hairs were observed during several searches for a direct connection between the food canal and the glossa. The absence of a circular connection is obvious and its absence is not explained in the available literature.

Observations at the Kuranda Butterfly Enclosure of the nectar feeding stations show the remarkable degree of control a butterfly has over its proboscis. All the butterfly species had an almost right angle flexion at about the midpoint of the proboscis. The proboscis is moved rapidly up and down until a circular opening leading to the artificial nectar below is found. To reach the artificial nectar the proboscis is then straightened out.

Watching a *Catopsillia pyranthe* feeding from a paper daisy (Fig. 7) revealed the characteristic bend at its mid point and very rapid up and down movements. Why is this so? A mid point bend allows the proboscis to be pushed vertically into a source of nectar. The rapid up and down movement is not so easily explained. The most likely reason is to force nectar up the proboscis. On the other hand it might just be to change the position of the proboscis for better access to nectar. But this would not need the rapid movements that were observed.

The proboscis is a soft structure only capable of entering a tube to obtain nectar or water. Some butterflies obtain moisture and possibly salts from wet sand. But not all proboscises are soft; there are moths that have adapted their proboscises so they can feed from thick-skinned fruit such as oranges. The proboscis is able to pierce the fruit in order to obtain water and nourishments. The two species in Australia are *Eudocima fullosia* and *E. materna.* There is also a blood sucking moth *Calyptra eustrigata.* The *Eudocima species* proboscis has been studied and the surface of the proboscis is smooth (Ref. 4). This is a great help in enabling the proboscis to pierce the rind of an orange. The chitin of these proboscises must have a high proportion of sclerosin. The resulting hole left by the proboscis is easily seen, and it provides a portal of entry for bacteria and fungi that rot the fruit. Several species are considered to be pests of commercial orchards. These moths fly only at night and can be seen by torchlight when feeding.

The smooth surface of the proboscises of these fruit piercing moths is in stark contrast to the rough surface of most butterfly proboscises (Fig. 8).

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Explanation of figures:
1. Light microscope view showing the junction of the galea.
2. Cross section of a coil of a proboscis. The decrease in size is due to the tapering of the proboscis. The width of that proboscis is 2 mm.
3. A single galea. The cellular membrane, muscles and nerves are easily seen. A single tracheole is seen just to the right of the trachea. The single galea is 1 mm across.
4. An electron microscope view of the termination of a proboscis. Note three circular sensilla. Magnification x 370.
5. A microscope view of a proboscis cut across close to the end of a coil. On either side is the food canal, the galeae rings are seen as is the very thin chitin bridging each ring.
6. *Catopsillia pyranthe* feeding shows galeal junction of the proboscis and also pseudo pupils.
7. *Catopsillia pyranthe* feeding on a paper daisy, demonstrates the knee bend of the proboscis.
8. An electron microcope view of the surface of a proboscis. Magnification x 1,000

Acknowledgments

Ms Beryl Edwards of Darwin N.T. who cut and stained the sections.
Dr. Richard Weir of Darwin N.T. who made the electron microscopic views of the proboscis.
Enid Selvey who edited the manuscript and used her computer skills to produce and e-mail the pictures.
Photos, except where acknowledged, Hilton Selvey

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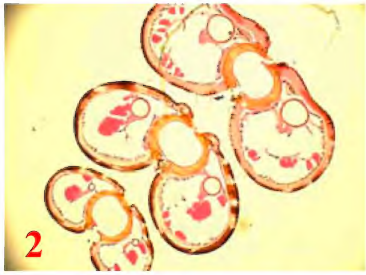
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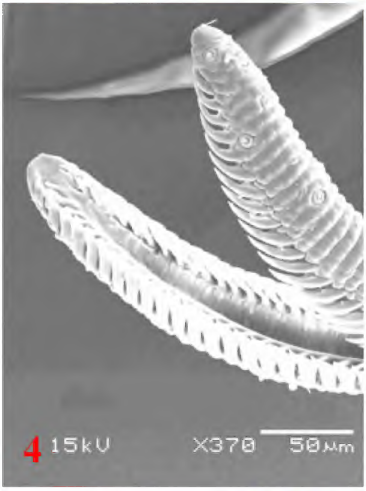
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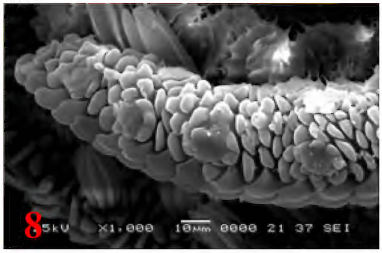
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The presence of *Lampides boeticus* (Lepidoptera: Lycaenidae) in The Society Islands and notes on other butterflies seen in French Polynesia. Part 1: Mo'orea and Bora Bora – *Kelvyn L. Dunn*

Introduction

Endowed with postcard-perfect mountains, lushly forested ravines and pretty lagoons, the Society Islands are the westernmost chain and one of five archipelagos in French Polynesia. Tahiti is the largest and best-known island – but there is much more to Tahiti than the tourist brochures suggest … for those whose interests run a little awry of the norm, there is a fascinating insect fauna to explore, one that includes rare endemics. Despite the industrial development around Pape'ete, the rugged terrain offers the flora and fauna (including the butterflies – the focus of my attention) a resistive stronghold. In fact, much of the interior is inaccessible with but a dozen main walking trails, only one of which crosses the island proper (Tahiti Nui). I anticipated that butterflies would be abundant towards the end of the humid rainy season, which in Tahiti is from November to April, so purposely visited in late February and early March to coincide with this. During the tropical monsoon the weather can be adverse: intermittent torrential rainfalls and heavily overcast conditions act at odds with basking butterflies (and rewarding fieldwork) but when the sun shines (even if for just short periods) butterflies usually become abundant. Surprisingly, during my stay, butterflies were generally sparse in the rainforests, scrub-lands and other haunts that I intensively searched, despite adequate periods of sunshine on each of Mo'orea, Tahiti and Bora Bora, the three islands I visited that year in 2007.

Island-biogeography dictates that remote islands – like those in eastern Polynesia – situated far from mainland source populations (e.g. Australia and New Guinea), often have low species diversity at best. During my visit I recorded only six species of butterfly with certainty, but the fauna of French Polynesia is rather limited – only 11 species have been recorded from the Society group (Tennent 2006), the archipelago of interest to me. Some very conspicuous and widespread butterflies in the South Pacific, such as *Danaus plexippus* (Monarch), *Melanitis leda* (Evening Brown) and *Junonia villida* (Meadow Argus) could not have been overlooked had they been on the wing, even if in just moderate numbers. They are each historically known from Tahiti and two of them from Mo'orea as well (Tennent 2006) so it seems remarkable that they remained undetected during my wanderings. Of interest, and present on two islands, the cosmopolitan species *Lampides boeticus* (Long-tailed Pea-blue) was seen frequently during March (but not at all in February) and is the first record for French Polynesia (Figs 1-4). My main intention though was not to find that species – an event that was merely opportunistic in happening – but to photograph a rare endemic, *Nacaduba tahitiensis*. To achieve this (which I did), I spent over 14 hours looking for

it, and once I had found it, carefully watched its habits in the tropical montane cloud forests on the upper slopes and summit of Mt Marau (1493m) – the only known locality in the world where it occurs! It is a peculiarly coloured species for a butterfly, and is characterised by a prominent metallic green sheen on the hind-wings beneath but which is less extensive than in *N. catochloris*, a rare sibling also known only from Tahiti (Hara and Hirowatari 1989). I found no evidence of *N. catochloris* (which I thought I might see too) but was unable to venture far into the Fautaua River valley headwaters where it was first found. The region beyond the popular swimming area known as the Pool of Loti, is a water catchment reserve and requires entry by permit. The original museum specimen (now lost) was said to have come from "about 11 miles inland" (Poulton and Riley 1928 as cited in Tennent 2006) which would place it past the falls and somewhere beyond the base of Mt Marau in the valley's upper reaches, perhaps at about 600-700m above sea level.

Another species warrants comment before beginning the inventory lists. The Varied Eggfly *Hypolimnas bolina* (locally ssp. *otaheitae*) was the most obvious butterfly – and a beautiful one at that – in the lowland coastal scrubs and agro-forests, its favoured haunts. On many islands in the South Pacific the female occurs in an assortment of forms, some mimetic of other butterflies; this extensive sex-linked polymorphism is rather unusual in butterflies generally. Those forms I encountered have been cross-referenced to one of the 25 varieties that Tennent (2009) illustrated to show the range of female variation farther west in Vanuatu. It is likely that remote archipelagos such as the Society group, with few stragglers having made it that far eastward in times past, might contain less variation due to ancient founder-effects. Indeed, only three forms were confirmed during this brief study; another two are likely though, but video images of these singletons were not obtained (so to reliably categorise them), as the adults chose not to pose whilst passing. The frequently seen female form was the archetypal one (Figs 5-8); it closely resembled the male in its basic pattern and, improving the match, presented with prominent iridescent violet-blue halos on the fore- and hind-wings (Figs 5 and 7), just like her mate (Figs 9 and 10). Tennent (2009) depicted a similar example from Futuna (Vanuatu), illustrated on p.135 at 'middle left' but the halos (if present) are not visible in that picture as they rely on light refraction to capture them. The other form often seen was the classic *nerina*-type (Fig. 11), the familiar variety encountered in Australia. Occasional intermediates between these were seen too (Fig. 12).

The butterfly listings that follow are based on my field diary notes, as documented at the time of each survey event. This first part covers only my records from Mo'orea and Bora Bora; the second part will list those from Tahiti Nui. Sites explored have been described as accurately as possible, and details of the habitats where species occurred and the prevailing weather conditions have been included. In addition, I recorded the local time in Tahiti (TAHT) when I commenced observations at a

particular site where one or more butterflies were seen, as well as the duration of each survey. The latter gives an idea of the time-effort involved and so acts as an estimate of the likely faunal representativeness for each (visual) sampling event. My reasoning here is that in coastal Queensland I have found that about 20 minutes during ideal weather is usually time enough to see the common species at any one site (Dunn 2001). Specific times of certain butterfly activities (the solar noon ranged from 1208-1212h TAHT during my visit) are given, and often these involved the only adults seen. The selected photographs (frame-grabs from video) illustrate adult behaviours, clarify wing patterns, and show habitats or vegetation pertaining to particular species.

Mo'orea Island

This verdant high island, situated some 25km leeward of Tahiti, is marked by mountain peaks that rise abruptly from the lagoon to heights ranging from about 700 metres near the coast to over 1200 metres in the interior (and their contours certainly caught my eye from the ferry!) There was no public transport so I walked and hitchhiked – my usual means in parts of the South Pacific – to creeks, rivers and waterfalls where I thought butterflies might be awaiting my attention and cinematographic effort.

Varari (on the western coast, about 5km SE of Hauru Point), 27 Feb 2007, c.1040h. Habitat: rural with secondary scrubs. Weather: sunny.

Hypolimnas bolina – One unsexed adult seen flying along roadside; it was likely a female of the archetypal form (cf. Tennent 2009, p.135 'middle left').

Afareaitu, near school, 27 Feb 2007, 1100-1130h. Habitat: rural gardens. Weather: sunny and hot. (Also revisited from 1550-1600h during overcast weather but nothing was flying). Species seen:

Hypolimnas sp. almost certainly *bolina* – One adult, noted as 'mostly black with highly enlarged pale fore-wing band – superficially like a giant Admiral butterfly'. It was seen flying about racemose flowers of a garden ornamental *Duranta* (Verbenaceae) at 1110h. From my description (no photo obtained) it may have been similar to one illustrated by Tennent (2009, p.135 'bottom centre') but had the adult settled, a close inspection may have been achieved enabling a better identification.

Hypolimnas bolina – A female with 'large white patches' was seen at 1120h about the same area as the one above. No photo obtained but it may have matched that illustrated by Tennent (2009, p.136 'top centre').

Phalanta ?gabertii – One nymphalid seen flying high up at 1120h. The adult was probably this species; members of this genus are vigilant, settle infrequently, and are hard to approach except when inspecting food plants (which it was not).

Afareaitu Cascade area: at Putoa River near Putoa waterfall and scarp, 27 Feb 2007, 1130-1550h (4 hours and 20 minutes). Habitat: riparian vine-forests and secondary scrubs with extensive areas of orange-flowered *Lantana camara* (Verbenaceae) below the cliffs (habitat photos: Figs 13-14), probably about 2km up river from coast. Weather: sunny periods and hot, but mostly overcast after 1300h. Adults were few and sightings spasmodic over the several hours of watching the *Lantana*. None was seen during overcast conditions on the return walk from the stream (where I had done most of my observations) to the Afareaitu Cascade, at which I arrived at 1530h and sought butterflies for 20 minutes more (without success). Species seen:

Hypolimnas bolina – Old males were seen perching and patrolling near creek-side *Lantana* at 1220h and 1500h. Several females were seen feeding at *Lantana* at 1240h, 1343h, 1440-45h (adults photographed). These females consisted of the ancestral form (archetypal) varying between two extremes (Tennent 2009: p135, 'top left' and 'middle left') with most being intermediate. The violet-blue halos were very prominent (Figs 5 and 7).

Euploea lewinii (ssp. *walkeri*) – One male photographed whilst basking at 1315h (Fig. 15), another seen nectaring at *Lantana* at 1343h.

Phalanta gabertii – Several seen at 1400h; adults were active only during sunny periods, and one fed at *Lantana* at that time. Another male was seen flying about 15m up in forest at 1425h, and although this latter adult was not seen up close it was most probably this same species as those seen near ground level.

To be continued ….

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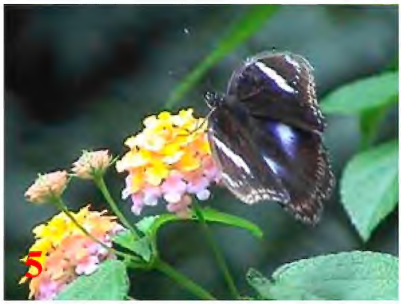
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Figs 1 and **2.** Females of *L. boeticus* roosting and perching near host plants. Vaitape, Bora Bora, 9 Mar. 2007.

Fig. 3. Female of *L. boeticus* ovipositing on buds of *Crotalaria* sp. Vaitape, Bora Bora, 9 Mar. 2007.

Fig. 4. Aged female of *L. boeticus* feeding at flower of *Crotalaria* sp. Matira Point, Bora Bora, 10 Mar. 2007.

Figs 5 and **7**. Female archetypal form of *H. bolina* displaying her violet-blue halos whilst feeding at *Lantana camara.* Putoa Waterfall area, Mo'orea, 27 Feb. 2007.

Fig. 6. Female archetypal form of *H. bolina* basking on *Lantana.* Putoa Waterfall area, Mo'orea, 27 Feb. 2007.

Fig. 8. Underside of archetypal form of female *H. bolina* during oviposition on *Synedrella nodiflora* (Asteraceae). Pool of Loti, Tahiti, 25 Feb. 2007.

Fig. 9. Perched male of *H. bolina* displaying violet-blue halos. Vaitape, Bora Bora, 9 Mar. 2007.

Fig. 10. Perched male of *H. bolina* (underside). Vaitape, Bora Bora, 9 Mar. 2007.

Fig. 11. Basking female of *H. bolina* (form *nerina*). Pool of Loti, Tahiti, 25 Feb. 2007.

Fig. 12. Basking female of *H. bolina* (archetype-*nerina* intermediate form). Pool of Loti, Tahiti, 25 Feb. 2007.

Photos Kelvyn Dunn

A new location for the Dusky Knight, *Ypthima arctous* (Fabricius, 1775) (Lepidoptera: Nymphalidae: Satyrinae) – *Ross Kendall*

In late September while visiting my brother's property "Koon Kool", about 25 km northeast of Hughenden, Queensland, I observed a small brown butterfly flying close to the ground with a jerky flight pattern, similar to that of a ringlet (*Hypocysta* Westwood, 1851 spp). After collecting a specimen and studying it in detail using Michael Braby's "Butterflies of Australia", I deduced that it was a Dusky Knight (*Ypthima arctous*) primarily because of its double-centred eyespot on the upper side of each forewing and a very small spot on the upper side of each hind wing. The wingspan was 28 mm.

The main conundrum was that this particular butterfly was collected hundreds of kilometres west of its previously reported range in Queensland, which is in open sunny habitats in coastal and sub-coastal areas, and this record represents a significant extension of this species previous range. At Hughenden it is certainly open and sunny where the habitat can best be described as open savannah or savannah woodland.

Wesley Jenkinson generously prepared and photographed the specimen which is illustrated below.

Female upper side *Ypthima arctous*

Female under side *Ypthima arctous*

Reference

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Who Lives Here in south west WA? – *Margaret Greenway*

In Issue No 62 of *Metamorphosis Australia* I described my findings of the turreted burrows of the trapdoor Palisade Spider *Neohomogona stirlingi* Main; unfortunately I did not have a photograph of an adult spider. Subsequently Barbara York Main was able to provide me with this photograph of an adult female of *Neohomogona bolganupensis* a close relative but confined to the Porongorup Ranges.

Photograph: Who Lives Here in south west WA: Female palisade spider *Neohomogona bolganupensis* (body length 20mm). Photo courtesy Dr Barbara York Main

BOOK REVIEWS

Birdwings' New Home by Lynette Reilly and Lois Hughes, 2011
Published by Friends of the Gold Coast Regional Botanic Gardens Inc.
Postal Address: PO Box 5653, GCMC, QLD, 9726
Website: www.fgcbg.org.au
24 pgs; soft cover; binding; stapled RRP $15.00 – Reviewed by *Graham McDonald*

There are many children's books about butterflies and their adventures, as well as their transient existence, but few, if any, can compare with this book in terms of biological accuracy.

Lyn's text and Lois' magnificent illustrations combine seamlessly to portray the story of the adult lives of two Richmond Birdwing butterflies. The plants adorning the pages are botanically very accurately depicted which is an important learning experience for the target readers. The three butterflies in the story are exquisitely true to their real-life counterparts. This is not surprising as both Lyn and Lois are very experienced in the art of interpreting the living world to readers by means of story telling and artwork.

The story, which is suited to lower primary students, begins in the birdwings' little piece of Utopia – a beautiful rainforest. The peace and quiet of this idyllic life is shattered by an all too familiar event – the clearing of the forest by humans. The rest of the story relates to the butterflies' search for a new home and the friends and enemies they meet along the way. Fortunately, they find a restored rainforest in a park, in which they can at last find a secure home.

This book illustrates the importance of realizing important 'flagship' species and **protecting** their habitat for them and other species. Children reading this impressive book will also come to realize the importance of **creating** habitat – the art and science of bushland restoration, so important in today's fragmented world, where we are losing bushland slowly but surely in a 'death by a thousand cuts'. Let's all hope that this simple little book will influence profoundly the perception of the natural world in children and their parents alike.

Congratulations to the author and illustrator on creating a unique piece of Australian literature.

Ed. The book is available from BOIC for a member's price of $13 – see enclosed order form.

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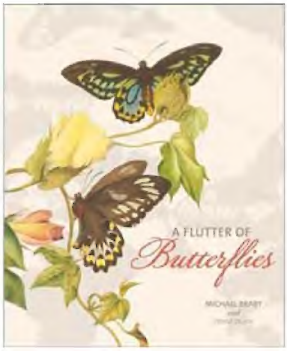


A Flutter of Butterflies by Michael Braby with Penny Olsen, 2011. Published by the National Library of Australia: printed by The Australian Book Connection. 106 pp. Dewey No.743.65789 – Reviewed by *Andrew Atkins*

Topic: Australian Butterflies in Art (from the National Library of Australia)

Decorative, symbolic and interpretive art has been with us since the first markings of ochre and charcoal on cave walls. Its sophistication preceded the written word as a means to convey messages and feelings between fellow humans. Through the ages, wild life, particularly animals, birds and plants, have been the favourite subjects of artists and from the Egyptians to the Renaissance accuracy of images readily enhanced the informative value of their work. The father of scientific illustration, Leonardo da Vinci, achieved highly sophisticated interpretations and practical skills and set the standard for modern artists working 'in the service of science'.

In this internet/digital world of 'get it first' rather than 'get it right' it seems anyone can be an expert on anything and publish it. Recently, two popular publications on Australian butterflies have appeared - curiously, both co-authored by reputable biological scientists. The first, *The Butterflies of Australia* by Orr and Kitching, is a

less than successful (from an art point of view) recycled version covered adequately by previous publications. However, the latest publication, *A Flutter of Butterflies,* deals with a very different aspect, Australian butterflies (and moths) in art. With a past record of publications on Lepidoptera, the sentiment 'not another book on butterflies!' might come to mind.

Michael Braby (prize-winning author of the definitive *'Butterflies of Australia: Their identification, biology and distribution*, 2000) with Penny Olsen (listed under 'Authors and Contributors') seems to have managed to bridge the disciplines of art and science in this recent publication. The book features artworks of butterflies and moths, portrayed in one form or another, by Australian and overseas illustrators mostly (but not all) represented in the National Library of Australia (the publisher) from the 1770s through the early colonial times to the turn of the 21st century, but also includes images created in the 1990s by courtesy of the CSIRO.

A Flutter of Butterflies is a celebration of painting by artists for the purposes of enjoyment (decoration), education (identification) and species' description (taxonomy). These include the excellent biologically informative works of the Scott sisters (initially working from Ash Island on the Hunter River), the delightfully decorative (principally botanical) work of Marian Ellis Rowan, the notable sensitive watercolours of Charles McCubbin ('*Australian Butterflie*s', 1971) and the graphic style, 'cut and paste' taxonomic illustrations of moths by Frantisek Gregor. There are many more.

The title of this publication is a bit corny, but it contains historical detail of each artist and many beautiful colour representations of their work (the insects readily and well identified). Wisely the authors have limited personal opinion on artistic merit (technique, interpretation, style and design etc). Much of the text deals with the history of the artist and their response to the subject matter. It is a good read with accurate, anecdotal and individual input. The book appears in the format of a 'coffee table' publication (although with soft cover), both delightful and colourful and well designed. Most readers would find the text both informative and importantly - original. In this book there are also interesting accounts relating to use of illustrations for the recording of the early scientific voyages and also the lampooning cartoons of such accesses perceived for Captain Cook's exploration of the Antipodes.

Scientific illustrators today would well identify with the financial woes that befell Edward Donovan (1768-1837): even today some publishers, scientists and commissioners are reluctant to pay for artwork, believing that artists work solely for pleasure and not monetary gain. Some government bodies (still) do not recognise art as a 'real' occupation. That is particularly the 'lot' of scientific illustrators whose work is not normally recognised until after death (note that only one of the artists included in 'A Flutter of Butterflies' is still alive!). However many more illustrators are now recognised in Fine Art Galleries.

It is a pity, then that many more examples of butterfly and moth artworks held in private, regional and state galleries, could not be included (text or plates) within the scope of this book. On a broader scale it would have been nice to see more historic examples of the amazing butterfly ('nahuatl') Mesoamerican art, often interpreted as human souls and the embodied concepts of war and sacrifice; or the examples of iconic aboriginal symbolist/spiritual rock and bark art. Braby and Olsen, however, do make some mention of works by the Aztecs and Amazon Peruvians, and that by the Yoingu people of the Northern Territory. The book's practical restrictions allowed only brief coverage of the taxonomic/identification work by Neville Cayley '*What butterfly is that*?' (Waterhouse, 1937), and it would have been nice to at least make mention of the colour paintings by H. W. Symmonds (Waterhouse and Lyell, 1914), and the beautiful additional illustrations in *Butterflies of Australia* (Common and Waterhouse, 1972) by Ninon Geier (pls. 22, and 40) and by Sybil Monteith (pl. 23). To round it off the much more recent and important Fine Art environmental (Lepidoptera) works of John Wolseley could have been included. How about it, National Library gallery?

Perhaps disappointing too is that some plates in A *Flutter of Butterflies* lack definition and crispness, but mostly the colours and tones remain true to life.
Generally this colourful book is very successful, well produced and a worthy historic document. Many examples of artistic mastery are included, and the reader will appreciate the style and competence of the publication. The authors, I think, should be praised for their bold foray into the art record.

Footnote: It has been recently suggested that research could be possible to identify variation through time and evolution of European species of butterfly depicted in the works of master artists (eg. the 'Dutch Masters'), although I'm not so sure how you could identify some images that exhibit so-called artistic licence!

Many illustrators (both 'full-time', or 'freelance') are employed in publishing 'houses', museums, herbariums, and environmental or medical institutions in Australia. These are mostly for the purpose of publication (Education, Science, Natural History and children's books, research papers, journals and magazines etc.). Those interested in following a career in biological art can access several courses in Australia. Probably the most thorough are courses at The University of Newcastle, which encompass both Fine Art and Illustration for the Gallery and publication. These are available to under graduate and post-graduate [Honours, Masters, PHD] science and art students.

Ed. - *A Flutter of Butterflies* is available from the Bookshop, National Library of Australia, Canberra ACT 2600, Ph. 1800 800 100. Cost $34.95 plus postage.

CORRECTION

Is it a 'Pill-bug' or a 'Trilobite Cockroach'? – *John Moss*

Thanks to both Martyn Robinson of Sydney's Australian Museum and Geoff Monteith recently of the Queensland Museum who brought my attention to the true identity of the 'trilobitic' creature, photographed on a rock by Glenn Leiper, which appeared in our last issue.

We have rotated the original image 180deg. When reoriented with head uppermost, what previously looked like eyes have disappeared! Although it superficially resembles a pillbug, it is actually the wingless female of an unusual cockroach, *Laxta* species. As Geoff says "some species live under loose bark and others are mottled, like the one in the photo, and live on the surface of rock outcrops (especially granite) where they are very camouflaged. They feed on encrusting microflora, like algae. The males of *Laxta* are fully winged and not often seen."

There are images of both sexes of *L. granicollis* in the CSIRO's two volume authoritative tome "The Insects of Australia".

IN A CORINDA GARDEN

Continuing the series of articles which Murdoch had left with me…(Ed.)

But who's the predator? - *Murdoch De Baar*

I have photographed three predator-reversal situations as they presented themselves in my Corinda garden.

Praying mantids (Mantodea) are regarded as the dominant predator in the insect world. My first photograph (Fig. 1) illustrates that other factors can come into play such as a seemingly inferior, smaller sphecid wasp arriving on the scene. The praying mantid will be dragged down into burrow, and the wasp will lay an egg on it.

The second photograph (Fig. 2) views ants, *Anonychomyrma* sp. (Formicidae: Dolichoderinae) filing past a jumping spider (Salticidae) who selects an occasional snack. There are enough ants to clean up this small spider. From observations at home, this salticid spider seems to specialise in following this particular ant species.

My third photograph (Fig. 3) shows the aggressive reduviid bug *Pristhesancus papuensis* Stal (capable of pulling a human into line) stuck in a spider's web. But **beware** Mr. Spider, things can change!

Photos Murdoch De Baar

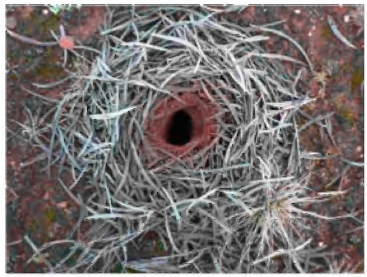
Fig. 1. A sphecid wasp drags a praying mantid.

Fig. 2. Ants file past a spider.

Fig. 3. A reduviid bug stuck in a spider's web.

MYSTERY INSECT

"Who Lives Here - Back O ' Bourke" - (Diameter of aperture 2cm) - *Margaret Greenway*



OTHER GROUP'S ACTIVITIES

IndigiScapes will host an art exhibition "Who's Hiding in my Garden" by Lois Hughes at the Centre, Runnymede Road, Capalaba, from January to April, 2012. The exhibition will showcase beautiful butterflies, moths and other insects. The display is a journey of discovery through the gardens, with visitors provided with a booklet showing all of the artworks but not where they are situated. A date is yet to be advised when they will hold a "Butterfly Day" to which BOIC has been invited. If you are on email we will let you know the date this will take place but you can visit the exhibition anytime from January to April.

Butterfly and Other Invertebrates Club Programme

Planning and Management Meeting

What: Our planning meetings are informative and interesting. As well as planning our activities we share lots of information. All members are welcome as this activity is also a general meeting of members.

When: **Saturday 11th February 2012** from **1.30 pm**

Where: Ross Kendall's home, 17 Eldon Street, Indooroopilly

RSVP: Ross on 07 3378 1187 or Daphne on 07 3396 6334

Disclaimer

The magazine seeks to be as scientifically accurate as possible but the views, opinions and observations expressed are those of the authors. The magazine is a platform for people, both amateur and professional, to express their views and observations about invertebrates. These are not necessarily those of the BOIC. The manuscripts are submitted for comment to entomologists or people working in the area of the topic being discussed. If inaccuracies have inadvertently occurred and are brought to our attention we will seek to correct them in future editions. The Editor reserves the right to refuse to print any matter which is unsuitable, inappropriate or objectionable and to make nomenclature changes as appropriate.

Acknowledgments

Producing this magazine is done with the efforts of:

- Those members who have sent in letters and articles
- Lois Hughes who provided the cover painting
- Daphne Bowden who works on layout, production and distribution
- John Moss, Dr. David Britton, Collection Manager, Entomology, Australian Museum and Dr. Trevor Lambkin for scientific referencing and proof reading of various articles in this issue of the magazine

We would like to thank all these people for their contribution.

Are You a Member?

Please check your mailing label for the date your membership is due for renewal. If your membership is due, please renew as soon as possible. **Membership fees are $25.00 for individuals, schools and organizations**. If you wish to pay electronically, the following information will assist you: BSB: **484-799**, Account No: **001227191**, Account name: **BOIC**, Bank: **Suncorp**, Reference: your membership number and surname e.g. **234 Roberts.**

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